Equilibrium:
\[ \sum F_x = 0 \Rightarrow 2P - 2\rho riw = 0 \]
\[ P = \rho riw \]

Stress & strain:
\[ \sigma_1 = \frac{P}{A} = \frac{\rho riw}{(r_0 - ri)w} = \frac{\rho ri}{r_0 - ri} \]

Hooke's Law:
\[ \varepsilon_1 = \frac{\sigma_1}{E} = \frac{\rho ri}{E(r_0 - ri)} \]  \( \theta \)

and also
\[ \varepsilon_1 = \frac{\rho ri (ri)}{2\pi ri} - \frac{2\rho ri}{2\pi ri} = \frac{\delta ri}{ri} \]  \( \theta \)

By \( \theta \) \( \theta \)
\[ \frac{\delta ri}{ri} = \frac{\rho ri}{E(r_0 - ri)} \]
\[ \delta ri = \frac{\rho ri^2}{E(r_0 - ri)} \]